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Road Safety Audits

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Introduction about New Zealand

The network of national roads, called State highways, is managed by a central government agency called Transit New Zealand ("Transit"). The Local Authorities manage nearly all other roads. There are 74 local authorities. Road construction and maintenance is funded by direct charges on road users. Transfund New Zealand ("Transfund") is the government agency that manages the fund. There are about 11,000km of State highways and about 81,000km of local roads. All investigation, design and construction work on State highways must be done by the private sector. Local authorities have moved in that direction.

Outline of this paper

Safety Audits of roads started in New Zealand in 1990, and has evolved over the decade into three distinct activities. This paper describes the promotion, development and implementation of each of these three activities.

The three activities are:

- Safety audit applied to project (or scheme) proposals
- Safety audit applied to the existing network of roads and
- Safety audit for specific purposes.

What is road safety audit?

The words "Safety Audit" mean different things to different people. So, it is important to define its use in any context.

In the road and traffic engineering disciplines, the words "safety audit" were used first in New Zealand in 1990. They are used for a process, which is part of the design and construction process, to ensure that works are built as safely as is practical. The process identifies potential safety problems before they become real ones. In this context, safety audit is an operational activity. It is a process of crash prevention.

There are many definitions of road safety audit. This is the one from the second edition of the Austroads Road Safety Audit Guide: "A road safety audit is a formal examination of a future road or traffic project, an existing road, or any project which interacts with road users, in which an independent, qualified team reports on the project's accident potential and safety performance".

Safety audit applied to project (or scheme) proposals

Safety audit on State highways

Transit was established in 1989 and created the position of Safety Audit Manager in its Review and Audit Division. The author was appointed to this position in 1990. Initially the author conducted series of Post Construction Safety Audits on recently completed safety improvements. The audits were good value but demonstrate that the audit recommendations are too late, audits need to be done before, not after construction.

Mike Goodge (ex Devon County Council) was invited to conduct workshops to raise awareness of road safety audit. Then the author attended safety audit training courses plus a study tour in the UK. His report to Transit Authority recommended a series of pilot audits and workshops.

Mike Goodge led pilot safety audits in four Transit regions. These pilot projects were used in a training workshop. Phil Jordan (Vicroads) was invited to lead pilot safety audits in the remaining three Transit regions and these were followed by further training courses.

Transit set up a working party to develop policy and procedures. The working party had members from all sectors of the roading industry. It developed the safety audit procedures. After extensive consultation these procedures were approved by Transit Authority and published in August 1993. The Transit Authority adopted a policy in July 1993 to apply the procedures to a 20% sample of projects annually.

Pilot audits helped considerably to get general acceptance of safety audit and provided a pool of experienced auditors who could continue the implementation. The training courses continued. Safety Audit of projects became an operational activity on State highways.

In 1996, Transfund New Zealand was created by separating the funding and audit functions from Transit. The position of Safety Audit Manager became part of the new agency, Transfund.

Safety audits on local roads

The Transit policy and procedures were not made mandatory on local roads. Instead they were promoted as “good practice”. The promotion took the form of pilot demonstration projects in the local authority sector.

A survey conducted in 1995 found that one third of local authorities said they did road safety audits, another third said they did not have any projects to audit. Presumably the remaining one third did have projects they could audit but did not.

After several years of conducting safety audit training courses, the course was incorporated into a general road safety engineering course.

Review of safety audit policies and procedures

Transfund has initiated a review of the safety audit policies and procedures. It ran a series of workshops to identify the issues that needed to be considered in a review and then set up a working party to undertake that review. The working party has representatives of all sectors and is part way through its work.

Some of the issues identified by the workshops are:

Issues to do with safety auditors

Who can be a safety auditor? Should there be an accreditation process for safety auditors, and if so, who should determine that process? In New Zealand, there is no such process, essentially there is a free market. It is up to the person commissioning an audit to determine the suitability of the auditors. Does this result in some inappropriate people being appointed as auditors.

How important is the independence of the auditors? The purist view is that the auditors must be completely independent of the organisations involved in the development of the project. But how important is this? Would some lesser test of independence result in biased audits?

The appointment of the auditors

Who should appoint the auditor? Should the project manager engage the auditor, or can the auditor be appointed as part of the contract to design the project? It is claimed that the second way can lead to undesirable consequences because the cost of the audit becomes a component of a competitive bid. There can be pressure on the auditors to do the audit cheaply. The author has heard of instances where an audit team has been instructed not to make a site visit. Also, whereas the current procedures recommend audit teams of at least two people, auditors have been appointed to single person teams.

Policy issues

At present the only national policy is the one adopted by the Transit Authority in 1993 to apply the audit procedures to a sample of 20% of projects on State highways annually. Is a 20% sample appropriate? How should the sample be chosen? Should the same policy be applied to projects on Local Authority roads, and if so, should the same requirement for the independence and size of audit teams be maintained?

Ranking of safety audit recommendations

In the current New Zealand procedures, the auditors are required to identify the safety problems inherent in the project plans or designs. However, the auditor is not obliged to make any assessment of how serious the problem is. Should the auditor be required to make an assessment of how serious the problem is, and if so, how should this been done? Is a subjective opinion on a three point scale “High”, “Medium”, “Low” adequate, or should the auditor be required to provide some objective analysis to support the audit findings?

Benefits of safety audit

Safety Audit was introduced in New Zealand in 1990/91 when there was almost no evidence that it would result in safety improvements. However it was a procedure that was aimed as crash **prevention**, and was a natural companion to accident investigation programme ("blackspot programme") that was aimed at crash **reduction**. Also, it fitted in well to the "quality" culture that was being promoted at that time.
There has been no research conducted in New Zealand to assess the effectiveness of safety audit. Should such research be undertaken? Some project managers are of the opinion that such research is unnecessary as the process clearly produces quality results for very little expense. However other believe that such research should be undertaken to convince the authorities that have not yet adopted a safety audit policy.

These and other issues are being considered by the working party.

Sharing experiences

One of the benefits claimed for safety audit is that it raises the awareness of safety issues amongst project managers, designers, and auditors. However each audit is an interaction between only a few people, and they may each learn something from the audit. The rest of the profession know nothing about those lessons. How can that learning be conveyed to everyone.

In an effort to accelerate the learning process, two reviews were commissioned. The first was a review of 30 audits of rural projects, and the second was a review of 36 audit reports of urban intersections. As well as listing the features identified most frequently in the reports, the reviewers also commented on some aspects of the audit process. For example, it was noted that the audits did not always take place at the stages in the project development prescribed in the procedures manual.

However, the author believes that the reports were not especially successful at accelerating the increase in safety awareness in the profession. Although the reports did identify the issues raised regularly, there was no advice on how to improve performance.

The most recent review was of roundabouts. The review was of safety audits of 50 roundabouts. In the first report, statistical information was provided on the findings of these 50 audits. In the second report published as a report titled "Ins and Outs", ten topics were selected. For each topic, the problem was described and illustrated with photographs. Then guidance was provided on how these issues should be addressed in the first place, again with photographs. Five hundred copies of this report have been issued and a reprint just ordered. Clearly this is the type of information that is useful to practitioners.

Safety audit of existing roads

This type of safety audit has caused disagreement between practitioners in different countries and so it is important to describe the development in New Zealand. It is, perhaps, somewhat different from other countries. In the author's opinion, the safety audit of existing roads is different from the safety audit of projects (or schemes) and the two types of audits should be clearly separated.

In New Zealand, the safety audit of existing roads was developed as a tool, amongst others, for Transfund to assess the performance of road controlling authorities. In this instance the safety performance of authorities is assessed. There now follows a brief summary of the development of these procedures.

Development of the procedures

In 1995 the work started with a demonstration by Fred Schnerring (New South Wales, Australia) and Gordon Lee (Queensland, Australia) of their methodologies. Pilot audits were conducted. This was under the auspices of Transit New Zealand. In 1996, Transit was split into Transfund (the funding agency) and Transit (the management of State highways). Transfund continued with the development of the procedures. Further pilot audits were conducted and draft procedures prepared in the same year.

In 1997 Transfund commenced an annual programme of safety audits using the draft procedures and started a review of the procedures. The review was completed in 1998 and the revised procedures published in the same year. Each year since then, Transfund has undertaken a programme of audits using the revised procedures.

The procedures

The author stresses that Transfund developed the procedures in order to assess the safety performance of road controlling authorities. They were not developed, in the first instance, for road controlling authorities to use as an operational procedure. Features of the audit procedures include:

- Transfund selects and appoints the independent audit team, which will often include a representative of another road controlling authority. The audit team is not familiar with the road network
- audit teams are often four or five people, and are accompanied by representatives of the authority being audited
- the fieldwork takes 3 days including entry and exit meetings
- the team selects a representative sample of roads to be audited. The expectation is that the findings of the audit from this sample will apply to the whole network
- inspections are made during the daytime and again at night
- the team identifies aspects that the road controlling authority does well, as well as the aspects that could be improved
- the team selects the aspects or features that were observed on a number of audited roads. The aspects that are seen only a few times are relegated to the appendices of their report
- the team’s recommendations are not written in terms of correcting the identified deficiencies; instead the recommendations focus on the authorities’ policies and procedures
- the team ranks each recommendation on a four point subjective scale

- the team's report follows a standard format, and goes through a formal reporting process that enables the authority to comment on the draft report
- the team's report is submitted formally to Transfund's Chief Executive.

Essentially, these audits are a global overview and do not try to identify every single deficiency that might exist on a road network, nor do they identify the exact location of every deficiency that is identified. Thus these audits are different to a safety inspection.

Database

Transfund has created a database that contains all the Transfund audit reports' recommendations. This is why the reports have to be written in a standard format. The database has a number of uses.

Firstly, it enables some moderation of the teams' ranking of audit recommendations. The ranking is subjective, but the database can identify when one audit team's opinion of a particular issue is at variance with the combined opinions of other audit teams. This does not mean that the team's opinion is incorrect as special conditions may have applied on the roads they audited.

Secondly, the database enables authorities' performances to be monitored over time – hopefully they will improve.

Thirdly, it can record the implementation of the audit teams' recommendations. This aspect of the database has yet to be developed.

Fourthly, the database can be interrogated for common recurring themes. Transfund has started a series of articles that describe these recurring themes and offer advice on how they may be addressed.

Future developments

Transfund proposes to change the commissioning of these audits. The proposal is that from some date in the future, road controlling authorities will be required to commission these audits under agreed criteria. The criteria, for example, frequency, team membership, sampling procedures, will be discussed and agreed with road controlling authorities.

Before this can happen, the subjective nature of the teams' recommendations must be addressed. Work is in hand to use the database described above to identify the extremes of teams' opinions to act as a moderating influence. In addition, further work is in hand to compare the audit findings with crash data. While the audits are not Crash Reduction Studies, the author would expect there to be some sort of correlation between the audit team findings and the incidence of crashes in general. There are some notable exceptions; for example, an audit team cannot easily determine the road surface's skid resistance by observation.

Austroads (the Australasian equivalent of AASHTO) has started some work on a risk rating system that can be applied to safety audit recommendations. It may be possible to adapt and develop the Austroads Ranking Procedure for New Zealand conditions and to provide a more objective basis to the audit teams' subjective opinions.

Training for safety auditors is of prime importance. Up to now, Transfund has operated an informal "succession planning" for safety auditors by inviting consultants to be team members so that they can learn the methodology "on the job" and then become team leaders for future audits. As the number of audits to be undertaken each year increases, so more auditors will be needed. Transfund is developing a training course for safety auditors.

Safety audit for specific purposes

The third application is developing audit procedures for specific purposes. The specific purposes being addressed at present by Transfund are:

- Temporary traffic management at road work sites
- Consideration for cyclists
- Traffic signals
- Land use development

Temporary traffic management at road work sites

In response to a perception that temporary traffic management at road work sites was very poor, Transfund has developed procedures for their safety audit. This work started in 1997. A worldwide search initially found no other jurisdiction had attempted this. Pilot audits in 1997 and 1998 revealed that the perceived poor performance was borne out with formal observation.

Transfund published Interim safety audit procedures in 1998, and held a series of workshops to explain them and to provide the results of the pilot audits conducted during their development. The audit procedures include a method for ranking the roadwork sites. The method is a numerical one, and attempts to assess the safety of road users. It is more than simply a compliance with "good practice".

Road Controlling Authorities, consultants and contractors were encouraged to use the interim audit procedures and to provide feedback on them. Some authorities have taken the Transfund methodology and modified them. Currently Transfund is reviewing its interim procedures and other authorities' procedures through a series of workshops and is collating industry feedback on them. It plans to issue revised procedures as a draft for industry consultation by October this year.

Since starting this work, the author has found two agencies worldwide that have already attempted to develop similar procedures.

The first is New York State DOT, who, under Jim Bryden's guidance have been inspecting worksites (work zones in the US) using a formalised process since 1986. Mr Bryden advised the author that they started with a numerical ranking system, similar to Transfund's one, but after a number of years of experience, they were able to discard it as their inspectors became very familiar with the methodology.

The second is VicRoads, in Australia, where Len Quinlivian in their Bendigo office has developed a rating system and has incorporated it into a computer programme that does the computations.

Consideration for cyclists

The current safety audit procedures do include questions about provisions for cyclists. With the recent resurgence in interest in cyclist as a serious transport mode, the question has been raised as to how well do the safety audit procedures and their application actually cater for cyclists' needs. The UK IHT has published a document "Cycle Audit and Cycle Review". A Transfund research project by Cambridge and Francis explored the potential for the application of these methods in New Zealand. The main conclusion of the research was that amongst the practitioners there is a lack of awareness and knowledge of the needs of cyclists. The research recommended the development of training courses.

Traffic signals

The New Zealand National Traffic Signals Committee approached Transfund with a concern about the inconsistent design and operation of traffic signals in different cities in New Zealand. Transfund commissioned a scoping study. The study recommended the development of audit procedures to cover both safety and efficiency, and to cover both existing facilities and new installations. The study also made recommendations in respect of design guidelines, the development of training courses and the option of a register of experienced practitioners.

Work has just started on the development of an audit procedure starting with existing facilities

Land use development

When investigating the uptake of safety audits in the local authority sector, the researcher collated responses to a questionnaire. Some responses indicated a mis-understanding by stating that the safety audit procedures do not apply to land use development proposals. There is nothing in the procedures that states this.

Transfund commissioned a study into the safety issues arising from land use development proposals. The consultants undertaking the study advised that there was no need to devise any new audit procedures and that existing procedures could ensure good safety outcomes from land use development proposals. The problem is to get the procedures used and used competently. The consultants recommended the development of good practice guidelines for the provision of safety provisions in the planning process.

Transfund has convened an industry working party to develop these guidelines.

Concluding Remarks

Work on the development and implementation of safety audit principles started in New Zealand in 1990. In the decade since then safety audit has developed in the following ways:

- The safety audit of projects has become an operational activity and is now a normal part of project development. By and large the industry is satisfied with the process. While there are undoubtedly ways in which the process could be improved, there are no wholesale calls for any radical changes. The author feels that the least well developed aspect of the safety audit programme is the sharing of the results of the audits with the industry as whole and thereby increasing awareness and performance.

- Most safety audits of existing roads are still commissioned by Transfund. Work in the next year will start to move the audits into the road controlling authority sector and become part of the normal procedures that authorities use to manage their road safety responsibilities.

- Application of the safety audit principles to specialist topics has raised the possibility of specialised audit procedures. Two applications are proceeding at present, namely temporary traffic control at roadwork sites and traffic signals. Investigations suggested that current procedures were adequate for two other specialist applications, namely cyclists' needs and land use development proposals. In these cases effort is being directed into training the development of best practice guidelines.

Safety Audit has been successfully implemented in New Zealand. There are still refinements that can be made. The full benefits of the programme are yet to be realised as the lessons learned from safety audits have not yet been integrated back into the normal activities of the industry.

Disclaimer

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